

MELIOIDOSIS

Bioterrorism Agent Profiles for Health Care Workers

Causative Agent: Melioidosis is caused by the gram-negative bacillus *Burkholderia pseudomallei*. The bacteria are widely distributed in the soil and water in Southeast Asia and northern Australia. Both humans and other susceptible animals may contract the disease.

Routes of Exposure: Humans are primarily exposed to melioidosis through direct contact with a contaminated source, such as soil or stagnant surface water.

Infective Dose & Infectivity: The infective dose is assumed to be low and all people are considered susceptible. In asymptomatic individuals severe injuries, burns, or debilitating disease may precipitate clinical onset of melioidosis.

Incubation Period: The incubation period can be as short as 2 days. However, years may elapse between the presumed exposure and the appearance of clinical disease.

Clinical Effects: The clinical manifestations of melioidosis include local skin infection, lung involvement, bacteremia, chronic suppurative infection in many organ systems, and neurologic infection. The most likely presentation due to bioterrorism would be pulmonary infection due to aerosolized bacteria. Inhalational melioidosis is an acute pyogenic process that can resemble plague pneumonia, with fever, severe systemic symptoms, and consolidative pneumonia. Secondary bacteremia can result in a papular or pustular rash that resembles smallpox lesions. Chest X-rays can show a variety of infiltrates, often upper lobe infiltrates that cavitate.

Lethality: Mortality from severe pneumonia and septicemia may be as high as 50%. In localized skin disease the mortality is low.

Transmissibility: Infection with *B. pseudomallei* generally occurs when contaminated soil or water comes in contact with lacerated or abraded skin. Melioidosis can also be acquired through aspiration or ingestion of water or inhalation of dust contaminated with the organism. Person-to-person transmission through direct contact may also be possible.

Primary contaminations & Methods of Dissemination: As a bioterrorism weapon, melioidosis would most likely be delivered via aerosolization.

Secondary Contamination & Persistence of organism: Only three cases of secondary infection have been reported. In one case it is thought that a caretaker acquired the disease from a patient with chronic melioidosis. The other two cases are believed to have occurred as a result of sexual contact following a chronic prostate infection.

Decontamination & Isolation:

Patients – Standard precautions should be practiced. Contact precautions should be used with sputum, sinus drainage, skin lesions and secretions.

Equipment, clothing & other objects – 0.5% hypochlorite solution (one part household bleach and 9 parts water = 0.5% solution) is effective for environmental decontamination.

Laboratory testing: Gram stain of lesion exudates reveals small gram-negative bacteria. These stain irregularly with methylene blue. A four-fold increase in titer supports the diagnosis of melioidosis. A single titer above 1:160 with a compatible clinical picture suggests active infection.

Therapeutic Treatment: The current treatment of choice for severe melioidosis is cetazidime and trimethoprim-sulfamethoxazole, although other broad spectrum antibiotic regimens are being evaluated. After several weeks of IV therapy, prolonged oral antibiotic treatment of 3-5 months or more is required to decrease the chance of relapse.

Prophylactic Treatment: There is no vaccine available for human use. There is no pre-exposure or post exposure medication for preventing melioidosis, although trimethoprim-sulfamethoxazole has been suggested.

Differential Diagnosis: The differential diagnosis for severe pneumonia should include unusual organisms such as plague, tularemia, and inhalational anthrax. Considerations for acute febrile pustular skin lesions include staphylococci, gonorrhea, secondary syphilis, ecthyma gangrenosum, and smallpox.

References:

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Available at <http://www.usamriid.army.mil/education/bluebook.htm>

For more information call (602) 364-3289

Frequently Asked Questions About Melioidosis

What is melioidosis?

Melioidosis is an infectious disease caused by the bacterium *Burkholderia pseudomallei*. Melioidosis is predominately a disease of tropical climates, especially in Southeast Asia. The bacteria causing melioidosis are found in contaminated water and soil. They are spread to humans and animals through direct contact with the contaminated source. Glanders is spread to humans from infected domestic animals.

Why has melioidosis become a current issue?

Burkholderia pseudomallei is an organism that has been considered as a potential agent for biological warfare and biological terrorism.

How common is melioidosis and where is it found?

Melioidosis is endemic in Southeast Asia, with the greatest concentration of cases reported in Vietnam, Cambodia, Laos, Thailand, Malaysia, Myanmar (Burma), and northern Australia. Additionally, it is seen in the South Pacific, Africa, India, and the Middle East. In many of these countries, *Burkholderia pseudomallei* is so prevalent that it is a common contaminate found on laboratory cultures. Moreover, it has been a common pathogen isolated from troops of all nationalities that have served in areas with endemic disease. A few isolated cases of melioidosis have occurred in the Western Hemisphere in Mexico, Panama, Ecuador, Haiti, Brazil, Peru, Guyana, and in the states of Hawaii and Georgia. In the United States, confirmed cases range from none to five each year and occur among travelers and immigrants.

How is melioidosis transmitted and who can get it?

Besides humans, many animal species are susceptible to melioidosis. These include sheep, goats, horses, swine, cattle, dogs, and cats. Transmission occurs by direct contact with contaminated soil and surface waters. In Southeast Asia, the organism has been repeatedly isolated from agriculture fields, with infection occurring primarily during the rainy season. Humans and animals are believed to acquire the infection by inhalation of dust, ingestion of contaminated water, and contact with contaminated soil especially through skin abrasions, and for military troops, by contamination of war wounds. Person-to-person transmission can occur.

What are the symptoms of melioidosis?

Illness from melioidosis can be categorized as acute or localized infection, acute pulmonary infection, acute bloodstream infection, and chronic suppurative infection. Inapparent infections are also possible. The incubation period (time between exposure and appearance of clinical symptoms) is not clearly defined, but may range from 2 days to many years.

- *Acute, localized infection* - This form of infection is generally localized as a nodule and results from inoculation through a break in the skin. The acute form of melioidosis can produce fever and general muscle aches, and may progress rapidly to infect the bloodstream.

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- *Pulmonary infection* - This form of the disease can produce a clinical picture of mild bronchitis to severe pneumonia. The onset of pulmonary melioidosis is typically accompanied by a high fever, headache, anorexia, and general muscle soreness. Chest pain is common, but a nonproductive or productive cough with normal sputum is the hallmark of this form of melioidosis.
- *Acute bloodstream infection* - Patients with underlying illness such as HIV, renal failure, and diabetes are at higher risk for this form of disease, which usually results in septic shock. The symptoms of the bloodstream infection vary depending on the site of original infection, but they generally include respiratory distress, severe headache, fever, diarrhea, development of pus-filled lesions on the skin, muscle tenderness, and disorientation, and abscesses found throughout the body.
- *Chronic suppurative infection* - Chronic melioidosis is an infection that involves the organs of the body. These typically include the joints, viscera, lymph nodes, skin, brain, liver, lung, bones, and spleen.

How is melioidosis diagnosed?

Melioidosis is diagnosed by isolating *Burkholderia pseudomallei* from the blood, urine, sputum, or skin lesions. Detecting and measuring antibodies to the bacteria in the blood is another means of diagnosis.

Can melioidosis be spread from person to person?

Melioidosis can spread from person to person by contact with the blood and body fluids of an infected person. Two documented cases of male-to-female sexual transmission involved males with chronic prostate infection due to melioidosis.

Is there a way to prevent infection?

There is no vaccine for melioidosis. Prevention of the infection in endemic-disease areas can be difficult since contact with contaminated soil is so common. Persons with diabetes and skin lesions should avoid contact with soil and standing water in these areas. Wearing boots during agricultural work can prevent infection through the feet and lower legs. In health care settings, using common blood and body fluid precautions can prevent transmission.

Is there a treatment for melioidosis?

Most cases of melioidosis can be treated with appropriate antibiotics. Treatment should be initiated early in the course of the disease. Although bloodstream infection with melioidosis can be fatal, the other types of the disease are nonfatal.

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